

### Amendments to the Specification

Please replace the paragraph at page 22, line 16 through page 23, line 8 with the following amended paragraph:

Figs. 4A and 4B comprise a flowchart that summarizes an embodiment of the present invention employing the Viterbi inference algorithm for SLDSs, as described above. The steps are as follows:

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Initialize LDS state estimates  $\hat{x}_{0|1,i}$  and  $\Sigma_{0|1,i}$ ; (Step 102)
Initialize  $J_{0,i}$ ; (Step 102)
for  $i = 1:T-1$  for  $t = 1:T-1$  (Steps 104, 122)
    for  $j = 1:S$  for  $i = 1:S$  (Steps 106, 120)
        for  $j = 1:S$  (Steps 108, 114)
            Predict and filter LDS state estimates
             $\hat{x}_{t|i,i,j}$  and  $\Sigma_{t|i,i,j}$  (Step 110)
            Find  $j \rightarrow i$  "transition probability"  $J_{t|t-1,i,j}$ 
            end (Step 112)
            Find best transition  $J_{t,i}$ , into state  $i$ ; (Step 116)
            Update sequence probabilities  $J_{t,i}$  and LDS
            state estimates  $\hat{x}_{t|i,i}$  and  $\Sigma_{t|i,i}$  (Step 118)
            end
        Find "best" final switching state  $i_{T-1}^*$  (Step 124)
        Backtrack to find "best" switching state sequence  $i_t^*$  (Step 126)
        Find DBN's sufficient statistics. (Step 128)
    
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Please replace the paragraph at page 24, line 1 through line 5 with the following amended paragraph:

Namely, for a given set of observations  $Y_T$ , a distribution  $Q(X_T, S_T | \eta, Y_T)$  with an additional set of *variational parameters*  $h$  is defined such that Kullback-Leibler divergence between  $Q(X_T, S_T | \eta, Y_T)$  and  $P(X_T, S_T | Y_T)$  is minimized with respect to  $h$ :

$$\eta^* = \arg \min_{\eta} \sum_{S_T} \int_{X_T} Q(X_T, S_T | \eta, Y_T) \log \frac{P(X_T, S_T | Y_T)}{Q(X_T, S_T | \eta, Y_T)}.$$